Environmentally Acceptable Wipe Solvent Integration

Background:

The Aerospace National Emission Standards for Hazardous Air Pollutants (NESHAPS) mandated all aerospace manufacturing and reworking facilities replace hand-wipe solvents containing Methyl Ethyl Ketone (MEK) and Toluene with environmentally-acceptable (EA) versions by September 1998. Hand-wipe solvents are used on aircraft painted surfaces in the surface preparation process to remove contaminants such as grease, dirt, oil, aircraft fluids, uncured sealants, and adhesives prior to the application of the coating system. This step is necessary because the surface condition significantly influences the adhesion of the coating to the substrate and subsequently the corrosion protection performance and long-term maintenance cost. The Air Force uses as hand-wipe solvents either MEK, a 50:50 mixture of MEK and Toluene, or paint thinners containing high concentrations of MEK & Toluene. During 1995, Air Force aircraft hand-wipe cleaning at the three Air Logistics Centers (ALCs) generated over 220,000 pounds of HAPs, primarily from MEK and Toluene. Therefore, the integration of Environmentally Acceptable (EA) Wipe Solvents may potentially reduce the HAPs emissions by 30%.

In 1997 the CTIO accomplished a project titled ”Hand Wipe Solvent Replacement Study assessment” reviewing 54 hand wipe products that were documented in four separate reports. Of the 54 products tested only eight wipe solvents were judged to be acceptable for immediate use. Only one product, DS-108, was selected in at least two studies.

As of 1998, only two EA Wipe Solvents, DS-104 and DS-108 manufactured by Dynamold, have qualified for inclusion in the AF Technical Order (T.O.) 1-1-8, Application and Removal of Organic Coating, Aerospace, and Non-Aerospace Equipment. Unfortunately, these two products have performed poorly at the field units, who complained of unsatisfactory evaporation rates, solvent residue, and a displeasing odor. Better performing EA Wipe Solvents are commercially available and past studies performed by the ALCs identified promising EA wipe solvents. However, the absence of an Air Force Specification for EA Wipe Solvent Performance and also a Qualification

Protocol (for EA Wipe Solvents) impede the integration of these products into widespread AF production use.

Project Sponsor/Customer: Air Force wide
Period of Performance: Apr 98 - May 01

Objective:

The CTIO's EA Wipe Solvent Integration project addresses the aforementioned deficiencies. CTIO performed a detailed technical assessment of the EA Wipe Solvent Specifications used by DoD and commercial aerospace operations to generate a single Air Force EA Wipe Solvent Specification. Subsequently, a Test Protocol for evaluating and qualifying promising EA wipe solvents against this specification will be developed.

Status:

Eight EA wipe solvent products were selected for full laboratory testing – 6 were solvent-based, one aqueous-based, and one a pre-saturated wipe. An USAF EA Wipe Solvent Qualification Specification and Test Protocol were developed. The efforts and results were presented to the Society of Automotive Engineers (SAE) G8/G9 meeting with a proposal to merge the USAF EA Wipe Solvent Qualification Specification and Test Protocol with the Aerospace Material Specification (AMS). SAE created a subgroup with the CTIO as chairman to achieve the aforementioned proposal. The CTIO EA Wipe Specification was sent to the SAE/G8-G9.

Project Plan: Phase 1 dated Jun 98, Phase 2 dated Aug 99
Test Plan: Phase 1 dated Jul, Phase 2 dated Nov 98
As of Date: Apr 01